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EOSDIS Core System Project

ECS Project Training Material Volume 3: Problem Management

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Hughes Information Technology Systems
Upper Marlboro, Maryland

ECS Project Training Material Volume 3: Problem Management

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Preface

This document is a contract deliverable with an approval code of 3. As such, it does not require formal Government approval. This document is delivered for information only, but is subject to approval as meeting contractual requirements.

Any questions should be addressed to:

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Abstract

This is Volume 3 of a series of lessons containing the training material for Version 2.0 Drop 2 of the Earth Observing System Data and Information System (EOSDIS) Core System (ECS). This lesson provides a detailed description of the process required for submitting and updating trouble tickets as well as investigating problems and identifying and implementing solutions.

Keywords: training, instructional design, course objective, problem management, trouble ticket, trouble ticket review board, failure review board, Remedy.

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Introduction

Identification

Training Material Volume 3 is part of Contract Data Requirements List (CDRL) Item 129, whose requirements are specified in Data Item Description (DID) 625/OP3 and is a required deliverable under the Earth Observing System Data and Information System (EOSDIS) Core System (ECS), Contract (NAS5-6000).

Scope

Training Material Volume 3 describes the process and procedures by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented. This lesson is designed to provide the operations staff with sufficient knowledge and information to satisfy all lesson objectives.

Purpose

The purpose of this Student Guide is to provide a detailed course of instruction that forms the basis for understanding problem management. Lesson objectives are developed and will be used to guide the flow of instruction for this lesson. The lesson objectives will serve as the basis for verifying that all lesson topics are contained within this Student Guide and slide presentation material.

Status and Schedule

This lesson module provides detailed information about training for Version 2.0 Drop 2. Subsequent revisions will be submitted as needed.

Organization

This document is organized as follows:

Introduction:	The Introduction presents the document identification, scope, purpose, and organization.
Related Documentation:	Related Documentation identifies parent, applicable and information documents associated with this document.
Student Guide:	The Student Guide identifies the core elements of this lesson. All Lesson Objectives and associated topics is included.
Slide Presentation:	Slide Presentation is reserved for all slides used by the instructor during the presentation of this lesson.

Related Documentation

Parent Document

The parent document is the document from which this ECS Training Material's scope and content are derived.

423-41-01	Goddard Space Flight Center, EOSDIS Core System (ECS) Statement of Work
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Applicable Documents

The following documents are referenced within this ECS Training Material, or are directly applicable, or contain policies or other directive matters that are binding upon the content of this document:

420-05-03	Goddard Space Flight Center, Earth Observing System (EOS) Performance Assurance Requirements for the EOSDIS Core System (ECS)
423-41-02	Goddard Space Flight Center, Functional and Performance Requirements Specification for the Earth Observing System Data and Information System (EOSDIS) Core System (ECS)

Information Documents

Information Documents Referenced

The following documents are referenced herein and amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

535-TIP-CPT-001	Goddard Space Flight Center, Mission Operations and Data Systems Directorate (MO&DSD) Technical Information Program Networks Technical Training Facility, Contractor-Provided Training Specification
609-CD-003-001	Operations Tools Manual for the ECS Project
611-CD-004-001	Mission Operation Procedures for the ECS Project

Information Documents Not Referenced

The following documents, although not referenced herein and/or not directly applicable, do amplify or clarify the information presented in this document. These documents are not binding on the content of the ECS Training Material.

220-TP-001-001	Operations Scenarios - ECS Release B.0 Impacts Technical Paper for the ECS Project
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305-CD-020-002	Release B SDPS/CSMS System Design Specification Overview for the ECS Project
305-CD-021-002	Release B SDPS Client Subsystem Design Specification for the ECS Project
305-CD-022-002	Release B SDPS Interoperability Subsystem Design Specification for the ECS Project
305-CD-023-002	Release B SDPS Data Management Subsystem Design Specification for the ECS Project
305-CD-024-002	Release B SDPS Data Server Subsystem Design Specification for the ECS Project
305-CD-025-002	Release B SDPS Ingest Subsystem Design Specification for the ECS Project
305-CD-026-002	Release B SDPS Planning Subsystem Design Specification for the ECS Project
305-CD-027-002	Release B SDPS Data Processing Subsystem Design Specification for the ECS Project
305-CD-028-002	Release B CSMS Communications Subsystem Design Specification for the ECS Project
305-CD-029-002	Release B CSMS System Management Subsystem Design Specification for the ECS Project
305-CD-030-002	Release B GSFC DAAC Design Specification for the ECS Project
305-CD-031-002	Release B Langley DAAC Design Specification for the ECS Project
305-CD-033-002	Release B EDC DAAC Design Specification for the ECS Project
305-CD-034-002	Release B ASF DAAC Design Specification for the ECS Project
305-CD-035-002	Release B NSIDC DAAC Design Specification for the ECS Project
305-CD-036-002	Release B JPL PO.DAAC Design Specification for the ECS Project
305-CD-037-002	Release B ORNL DAAC Design Specification for the ECS Project
305-CD-038-002	Release B System Monitoring and Coordination Center Design Specification for the ECS Project
305-CD-039-002	Release B Data Dictionary Subsystem Design Specification for the ECS Project
601-CD-001-004	Maintenance and Operations Management Plan for the ECS Project
604-CD-001-004	Operations Concept for the ECS Project: Part 1-- ECS Overview

604-CD-002-003	Operations Concept for the ECS Project: Part 2B -- ECS Release B
605-CD-002-001	Release B SDPS/CSMS Operations Scenarios for the ECS Project
607-CD-001-002	ECS Maintenance and Operations Position Descriptions for the ECS Project
500-1002	Goddard Space Flight Center, Network and Mission Operations Support (NMOS) Certification Program, 1/90

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Problem Management

Lesson Overview

This lesson will provide you with the complete process by which trouble tickets are submitted and updated. In addition, the lesson describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented.

Lesson Objectives

Overall Objective - The overall objective of the Problem Management lesson is for Science and Communications Maintenance and Operations (M&O) personnel to develop proficiency in the procedures that apply to the trouble ticketing/problem resolution process for the Earth Observing System (EOS) Data and Information System (EOSDIS) Core System (ECS).

Condition - The student will be given a written description of an operational problem (affecting ECS hardware, software, documentation, or procedures), access to the Trouble Ticketing System, a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will use the Trouble Ticketing System without error in accordance with the prescribed process and procedures to submit, update and complete the specified parts of a trouble ticket.

Specific Objective 1 - The student will perform the steps involved in submitting a trouble ticket.

Condition - The student will be given a description of an operational problem to be reported through the Trouble Ticketing System, access to the Trouble Ticketing System (through a workstation or terminal), a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will perform without error the steps involved in submitting a trouble ticket in accordance with the applicable procedure.

Specific Objective 2 - The student will perform the steps involved in making a change to an existing trouble ticket.

Condition - The student will be given a description of a change to be made to an existing trouble ticket, access to the Trouble Ticketing System (through a workstation or terminal), a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will perform without error the steps involved in making a change to an existing trouble ticket in accordance with the applicable procedure.

Specific Objective 3 - The student will describe the general steps in the routine trouble ticket problem resolution process, including the differences that result from assignment of the various priority levels.

Condition - The student will be given a description of a routine operational problem to be resolved through the problem resolution process, a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in the routine trouble ticket problem resolution process in accordance with the applicable procedure.

Specific Objective 4 - The student will describe the general steps in the process of preparing a Trouble Ticket Telecon and processing a trouble ticket through the Failure/Malfunction Review Board.

Condition - The student will be given a description of an operational problem to be processed through the Failure/Malfunction Review Board, a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in the processing of an operational problem through the Failure/Malfunction Review Board in accordance with the applicable procedure.

Specific Objective 5 - The student will describe the general steps in the process of making emergency fixes to operational problems.

Condition - The student will be given a description of an operational problem to be processed through the emergency fix process, a copy of 609-CD-003-001, *Operations Tools Manual*, and a copy of 611-CD-004-001, *Mission Operation Procedures for the ECS Project*.

Standard - The student will state without error the general steps involved in making an emergency fix of an operational problem in accordance with the applicable procedure.

Importance

This lesson applies to students who will be internal users or operators of the ECS (including support staff). The lesson will provide them with the knowledge and skills needed for submitting trouble tickets and making additional entries on trouble tickets in the course of investigating ECS problems reported on trouble tickets. They will need the knowledge and skills on the job when they encounter ECS hardware, software, documentation or procedural problems that they cannot readily fix, that affect other users/operators, or that are system-wide problems. The lesson describes why and how trouble tickets are submitted and updated. In addition, it describes in general terms the processes by which problems submitted on trouble tickets are investigated and solutions are identified and implemented. Consequently, the students will become aware of what happens to the trouble tickets they submit and what they can expect in terms of feedback on their submittals.

Writing a Trouble Ticket (TT)

Purpose and Functions of Trouble Tickets

A trouble ticket (TT) is an electronic document that serves the following purposes:

- reporting/recording problems.
- recording an idea for a system enhancement.

The problems reported most frequently affect the following ECS components:

- hardware.
- software.
- technical documents.
- procedures.

Trouble tickets that are used for recording an idea for a system enhancement are considered by the Sustaining Engineering organizations either at the Distributed Active Archive Centers (DAACs) or at the ECS Sustaining Engineering Organization (SEO).

Trouble tickets are submitted by:

- users in the science community.
- ECS operators.
- developers using ECS.

Trouble tickets have two states:

- open.
- closed.

A trouble ticket is “open” (in process) until the problem has been resolved and the problem resolution has been officially approved. Then the trouble ticket is “closed.”

Problems which require changes that could have significant effects on the ECS configuration must be referred to the configuration management process. If the TT investigation indicates that a configuration change is required to solve a problem or to develop an enhancement, the subject of the TT becomes a configuration management issue and a Configuration Change Request (CCR) is prepared.

- A CCR provides documentation of the configuration management process by which changes to ECS configuration items (CIs) or configuration controlled items (i.e., components of CIs) are approved and implemented.
- A trouble ticket leads to a CCR only when a configuration change is proposed.

The ECS Trouble Ticketing System provides a consistent means of...

- reporting ECS problems.
- classifying problems.
- tracking the occurrence and resolution of problems.

The Trouble Ticketing System is managed by a computer software package called Remedy. Remedy's Action Request System provides a distributed Trouble Ticketing System that furnishes ECS centers (e.g., System Monitoring and Coordination Center (SMC), DAACs) with a common means of classifying, tracking, and reporting both the occurrence of problems and their resolution to ECS users and operations personnel. The Trouble Ticketing System performs the following functions:

- Provides a graphical user interface (GUI) that provides operations personnel with access to all trouble ticketing systems.
- Provides a common trouble ticket entry format.
- Stores trouble tickets.
- Retrieves trouble tickets upon request.
- Allows operations personnel to forward problem reports from one ECS center to another.
- Produces stock and common reports on ECS problems.
- Provides interfaces with users' and operators' e-mail to provide automatic notification of events that affect a trouble ticket (such as logging in of a newly submitted trouble ticket or "close-out" (completion) of a trouble ticket).
- Offers an application programming interface through which ECS computer programs can automatically submit trouble tickets.
- Provides summary information to the SMC from each DAAC to allow SMC personnel to prepare trend reports on ECS problems.
- Defines a consistent "life cycle" (from submittal to completion) for trouble tickets.
- Allows each ECS center to customize trouble ticket escalation and action rules.
 - Escalation rules are time-activated events.

- When a trouble ticket meets whatever conditions are specified in the rules, the Trouble Ticketing System takes the designated action. For example:
 - notification (of either a user or support staff member).
 - writing to a log file.
 - setting a field value on the trouble ticket.
 - running a custom-written process.

In addition to the functions performed by Remedy's Action Request System, the Trouble Ticketing System provides other methods of submitting and/or keeping track of trouble ticket status.

- set of custom hypertext markup language (HTML) documents.
 - allow registered users to submit new trouble tickets and determine the current status of any of their previous trouble ticket entries via the Internet.
- text e-mail template.
 - allows automated entry of trouble ticket information.
- contacting a User Services representative at one of the DAACs.
 - by telephone.
 - in person.

In addition to tracking trouble tickets, the Remedy Action Request System provides a User Contact Log for User Services representatives.

- There is a separate schema (GUI) that accepts the entries which User Services personnel enter for each contact they have with ECS users.
- A button on the User Contact Log schema allows the User Services representative to automatically fill out a new trouble ticket simply by clicking on the button.
 - Clicking the button transfers data from the contact log to the appropriate fields on a trouble ticket form.

Writing/Submitting Trouble Tickets

The particular method that a person who is submitting a trouble ticket uses depends on whether the person submitting the trouble ticket is an internal or external user of ECS.

- External users submit trouble tickets either through the HTML documents, e-mail template, or by contacting User Services.
- Internal operators and users of ECS submit trouble tickets using the Remedy Action Request System.

Because this course is intended for ECS personnel, only the internal method (using Remedy) is described in this lesson.

The Trouble Ticketing System is wholly automated.

- TTs are handled electronically.
 - Common distributed-access database system.
 - Remedy is the database tool.
- Supporting documentation for a trouble ticket must be handled separately.
 - It is not possible to attach a file in Remedy.
 - Supporting documentation in electronic form (e.g., computer files) must be sent to the local Trouble Ticketing System database administrator. (Attach an e-mail message identifying the corresponding trouble ticket number, submitter identification and any other relevant information.)
 - Trouble Ticketing System database administrators:
 - SMC Configuration Management (CM) Administrator
 - SEO Operations Readiness and Performance Assurance Analyst
 - DAAC Operations Readiness and Performance Assurance Analyst
 - Supporting documentation **not** in electronic form (if any) is handled by the local Trouble Ticketing System database administrator and is listed as an attachment to the trouble ticket.

The procedure for writing and submitting a trouble ticket is performed by any internal ECS user or operator who needs to submit a trouble ticket to have an operating problem investigated. The procedure starts with the assumption that the user or operator has logged in to ECS and the proper desktop environment is being displayed.

It is expected that eventually the ECS DAAC desktop will be configured to allow access to Remedy by selection of a desktop Icon. In the interim, access to Remedy must be gained through the use of UNIX commands.

In any case, launching Remedy starts with the assumption that the applicable servers are running and the operator has logged in to the ECS system.

Launching Remedy Using UNIX Commands

1 Access the command shell.

- The command shell prompt is displayed.

NOTE: Commands in Steps 2 through 12 are typed at a UNIX system prompt.

2 Type **xhost** + then press the **Return/Enter** key on the keyboard.

3 Open another UNIX window.

4 Start the log-in to the MSS client server by typing either **telnet *hostname*** (e.g., **g0msh08**), **rlogin *hostname***, or **rsh *hostname*** in the second window then press the **Return/Enter** key.

- If you use the **telnet** command, a **Login:** prompt appears; continue with Step 5.
- If you use either the **rlogin** or **rsh** command, the system uses the User ID currently in use; go to Step 7.

5 If a **Login:** prompt appears, log in as yourself by typing your **UserID** then pressing the **Return/Enter** key.

6 At the **Password:** prompt type your **Password** then press the **Return/Enter** key.

7 Type **setenv DISPLAY *clientname*:0.0** then press the **Return/Enter** key.

- Use either the terminal/workstation IP address or the machine-name for the ***clientname***.

8 Type **cd */path*** then press **Return/Enter**.

- Change directory to the directory (e.g., **/usr/ecs/*mode*/COTS/bin**) containing the Remedy command files.
- The ***mode*** will most likely be one of the following operating modes:
 - OPS (for normal operation).
 - TS1 (for testing).
 - SHARED (for other uses).

Note that the separate subdirectories under **/usr/ecs** apply to different operating modes.

9 Type **aruser &** then press **Return/Enter**.

- The Remedy Action Request System Main User Tool window appears on the screen.
-

The basic steps of the procedure are as follows (the sequence of Steps 4 - 6 is not critical):

Writing a Trouble Ticket

- 1 If the schema in the Action Request System window is anything other than the **RelB-Trouble Tickets** schema (Figure 1), select **File** → **Open Schema** from the pull-down menu.
 - The **Open Schema** schema (Figure 2) appears in a box.

The screenshot shows a software window titled "Action Request System — RelB-Trouble Tickets (g0rmsh08)". The window has a menu bar with "File", "Edit", "Query", "Actions", "Macros", "Windows", and "Help". The main area contains several input fields and buttons. At the top, there are fields for "Ticket-Id", "Ticket Status" (with a "Clear" button), and "Assigned-Priority" (with a "Clear" button). Below these are "Short Description" and "Submitter Impact" (with a "Clear" button). The middle section has "Long-Description" and "Resolution Log (End User Sees)" on the left, and a larger "Detailed Resolution Log" on the right. The bottom section is organized into three columns of fields: "Submitter ID", "Assigned-To", "Closing Code", "Submitter Name", "Last-modified-by", "Closed-by", "Submitter Phone", "Create-date", "Close-date", "Submitter eMail", "Last-Modified-date", "Software Resource", "Submitter Home DAAC", "Related CCR", "Hardware Resource", "History", "Key Words", "Hardware Information", "CI", "Problem Type", and "List All Masters". At the bottom, there is a "Query" field and a set of buttons for query operations: "LIKE", "AND", "OR", "NOT", and "Fields".

Figure 1. Release B Trouble Tickets Schema

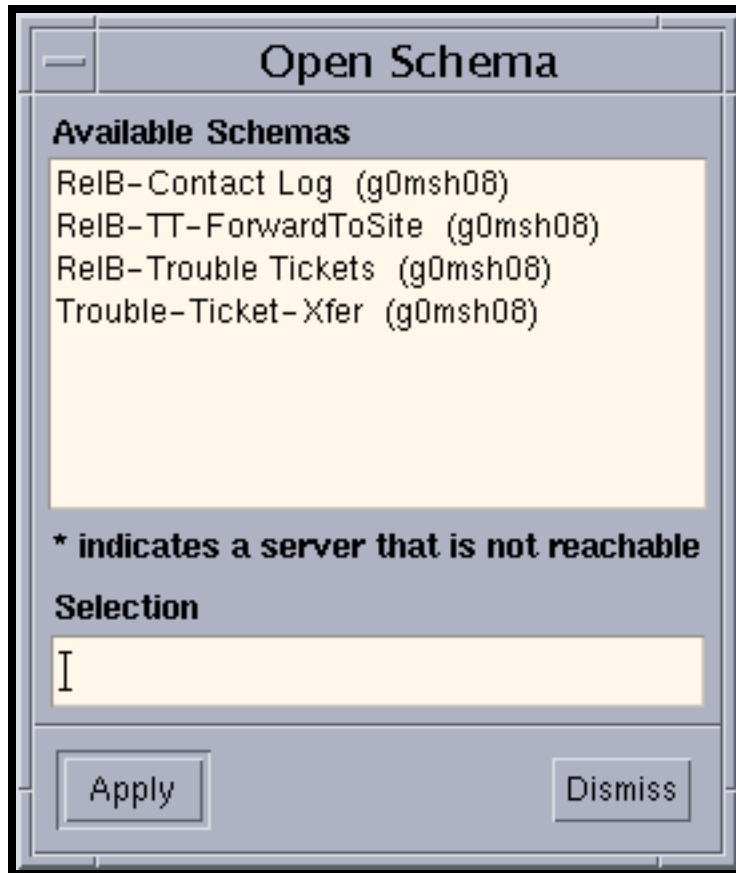


Figure 2. "Open Schema" Window

- 2 Click on **RelB-Trouble Tickets** in the **Open Schema** list of schemas to highlight it.
- 3 Click on the **Apply** button in the lower left-hand corner of the **Open Schema** dialog box.
 - The **RelB-Trouble Tickets** schema (Figure 1) is displayed.
 - Allows operations personnel access to TTs for purposes of submitting, reviewing, or modifying them.
- 4 Select **File** → **Open Submit** from the pull-down menu.
 - The **Submit** GUI (Figure 3) is displayed.
 - **Submit** resembles the **RelB-Trouble Tickets** schema except for an **Apply** button in the lower left-hand corner and a **Dismiss** button in the lower right-hand corner.

The screenshot shows a software window titled "Submit — RelB-Trouble Tickets (g0msh08)". The interface includes the following elements:

- Top Section:**
 - Ticket ID: [GSP]
 - Ticket Status: New
 - Assigned-Priority: Low
- Description Section:**
 - Short Description: [] (with a document icon)
 - Long-Description: [] (with a document icon)
 - Resolution Log (End User Sees): [] (with a document icon)
 - Detailed Resolution Log: [] (with a document icon)
- Form Fields Section:**
 - Submitter ID: [] (with a document icon)
 - Assigned-To: [] (with a document icon)
 - Closing Code: [] (with a document icon)
 - Submitter Name: []
 - Last-modified-by: []
 - Closed-by: []
 - Submitter Phone: []
 - Create-date: []
 - Close-date: []
 - Submitter email: []
 - Last-modified-date: []
 - Software Resource: [] (with a document icon)
 - Submitter Home DAAC: []
 - Related CCR: []
 - Hardware Resource: [] (with a document icon)
 - History: [] (with a document icon)
 - Key Words: [] (with a document icon)
 - Hardware Information: []
 - CI: [] (with a document icon)
 - Problem Type: [] (with a document icon)
- Buttons:**
 - Apply
 - Clear
 - Set to Defaults
 - Dismiss
 - List All Masters
 - List This TT's Duplicate(s)

Figure 3. "Submit" Window

5 Type a short description of the problem (up to 128 characters) in the **Short Description** field.

- **Short Description** is a mandatory entry.

The **Short Description** field and some other fields have a document icon associated with them so you can click on the icon and open a window in which you can type information at length.

- 6 Place the mouse cursor on the **Submitter ID** pick-list icon. Press the left mouse button and move the cursor down the list until your ID is highlighted; then release the mouse button to transfer your ID into the **Submitter ID** field.
- Remedy will automatically fill in the following fields when you actually submit the TT:
 - Submitter Name.
 - Submitter Phone [number].
 - Submitter eMail [address].
 - Submitter Home DAAC.
 - If your name is not on the pick-list, you must type the information in all of the preceding fields.
 - If you have any questions concerning what should be entered in any of the identification fields, ask the Trouble Ticketing System database administrator.
- 7 Click and **hold** on the **Submitter Impact** option button to display a menu of “impacts.”
- The following menu of impact codes is displayed:
 - High.
 - Medium.
 - Low.
 - **Submitter Impact** is an optional field.
 - Default value (**Low**) is set automatically if you do not make a selection in this field.
- 8 Select the desired impact code by moving the cursor to the desired code in the menu to highlight it, then release the mouse button.
- Selected code is displayed on the **Submitter Impact** option button.
- 9 Fill in the any of the following optional fields which provide useful information for the problem investigation:
- **Long Description** (description of the problem using up to 255 characters).
 - **Software Resource** (software with which the problem originated).
 - **Hardware Resource** (hardware from which the problem came).

- 10** When you are satisfied that the information in the trouble ticket fields is correct, click on the **Apply** button in the lower left-hand corner of the **Submit** GUI to submit the TT.
- TT is entered into the Remedy database.
 - A message should appear at the bottom center of the form notifying you that the TT has been successfully submitted.
 - Trouble ticket identification number is included in the message.
 - Remedy will send you an e-mail message to confirm that the trouble ticket has been entered into the database.
 - If you do not receive confirmation, you should contact the Trouble Ticketing System database administrator.
- 11** To exit from the **Remedy Action Request System** first click on the **Dismiss** button in the lower right-hand corner of the **Submit** GUI.
- 12** Select **File** → **Exit** from the pull-down menu.
- 13** If it is necessary to provide back-up information/documentation, such as a file that illustrates the problem, send the documentation to the Trouble Ticketing System database administrator.
- Send an e-mail cover message that contains the following information:
 - Trouble ticket number (Ticket-Id).
 - Submitter ID.
 - Relevant information concerning the attachment.
-

Documenting Changes

Reviewing and Modifying Trouble Tickets

Trouble tickets must be modified as the problem resolution process progresses and the various parties involved in the process have to make entries on the trouble ticket, for example:

- assignment to a technician for problem resolution.
- resolution log entries.
- changes of status.
- forwarding to another site.

The changes are the result of better understanding of the nature of problems, proposed and revised solutions resulting from the investigation or Trouble Ticket Review Board decisions.

Access to trouble ticket data is controlled by the database administrator for the Trouble Ticketing System. The database administrator assigns each user of Remedy's Action Request System certain access privileges.

- Access privileges determine which trouble ticket fields (if any) you can modify.
- Examples:
 - Some operators will be allowed to submit TTs only.
 - Operations Supervisor must be able to submit TTs, modify ticket status, assign priority, assign the TT to a specific investigator, and make many other modifications.

The basic steps of the procedure for reviewing or modifying TTs through Remedy are as follows:

Reviewing and Modifying Open Trouble Tickets

- 1 Access the **Remedy User Tool** by performing the Launching Remedy Using UNIX procedure defined earlier in this lesson.
 - The **Remedy Action Request System Main User Tool** window appears on the screen.
 - Either the last schema that was open or a blank **RelB-Trouble Tickets** schema (Figure 1) is displayed.

- 2 If the schema in the Action Request System window is anything other than the **RelB-Trouble Tickets** schema (Figure 1), select **File** → **Open Schema** from the pull-down menu.
 - The **Open Schema** schema (Figure 2) appears in a box.
- 3 Select (highlight) **RelB-Trouble Tickets** from the **Open Schema** list of schemas.
- 4 Click on the **Apply** button in the lower left-hand corner of the **Open Schema** dialog box.
 - The **RelB-Trouble Tickets** schema (Figure 2) is displayed.
- 5 If the trouble ticket to be modified has some characteristic that will allow you to restrict the system's querying of the database, enter the data in either the corresponding field on the **RelB Trouble Tickets** schema or in the **Query** field at the bottom of the form.
 - For example, you may restrict querying to only those trouble tickets that have a high assigned priority and have been submitted within the last three days.
- 6 Select **Query** → **List** from the pull-down menu.
 - The **Query List** dialog box (Figure 4) is displayed.
 - contains a list of trouble tickets.
- 7 Select (highlight) the specific trouble ticket(s) that you would like to review/modify.

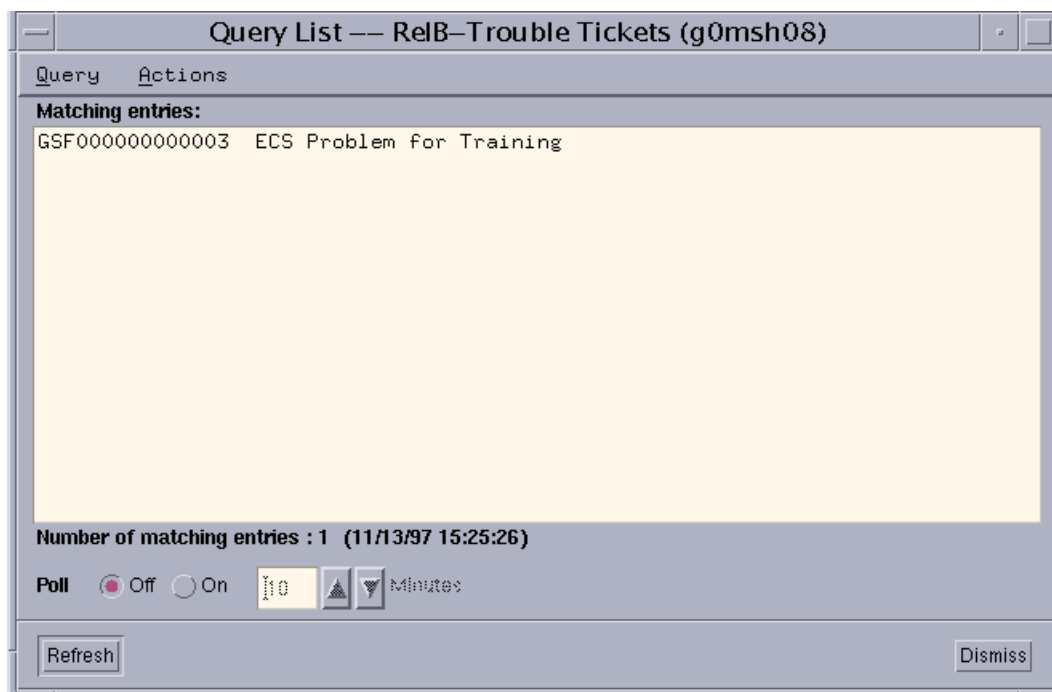


Figure 4. Query List Dialog Box

- 8 Select **Query** → **Modify Individual** from the pull-down menu of the **Query List** dialog box.
 - Use **Modify All Selected** (rather than **Modify Individual**) *only* if you wish to make *exactly* the same changes to a group of highlighted TTs.
 - The **Modify Individual** GUI is displayed.
 - resembles the **RelB-Trouble Tickets** schema except for an **Apply** button in the lower left-hand corner and a **Dismiss** button in the lower right-hand corner
 - current trouble ticket data appears in the fields on the trouble ticket form.
 - 9 Review and/or modify the trouble ticket fields as necessary.
 - The fields are described in Table 1 (extracted from 609-CD-002-001, *Operations Tools Manual*.)
 - Some of the fields (e.g., **Submitter ID**, **Assigned-To**, **Closing Code**) have pick-list icons associated with them so you can click on the pick-list icon and highlight the text to be entered in the field.
 - Some of the fields (e.g., **Detailed Resolution Log**, **History**) have diary or document icons so you can open a window in which you can type information at length.
 - 10 If you wish to forward the TT to another ECS center, you must first click on the **Ticket Status** option button and select **Forwarded** from the option menu.
 - You must be authorized to forward TTs.
 - 11 When forwarding a TT to another ECS center, select the TT's destination using the **Forward-to** field pick list then click on the **Forward** button.
 - Be sure to go to the next step (applying the change) or there will be no local record that the TT was forwarded.
 - If you forward a TT to another center, it will receive a new **Ticket-Id** at that center and the original identifier will be transferred to the **Unique-Identifier** field.
 - The TT will retain its original **Ticket-Id** at your center.
 - 12 When you are satisfied that the information in the trouble ticket fields is correct, click on the **Apply** button to make the changes effective.
 - 13 To exit from the Remedy Action Request System first click on the **Dismiss** button in the lower right-hand corner of the **Modify Individual** GUI.
 - 14 Select **File** → **Exit** from the pull-down menu.
-

Table 1. Trouble Ticket Field Description (1 of 2)

Field Name	Data Type	Size	Entry	Description
Ticket-Id	Character	15	System generated	Ticket number which is set and maintained by the system.
Ticket Status	Selection	4	Required	Status of the trouble ticket.
Assigned-Priority	Selection	4	Required	Priority of trouble ticket assigned at the site (HIGH, MEDIUM, LOW).
Short Description	Character	128	Required	Short description of the problem.
Submitter Impact	Selection	4	Optional	Impact of the problem to the submitter.
Long-Description	Character	255	Optional	Long description of the problem.
Resolution Log (End User Sees)	Diary	Unlim	Optional	General steps in the resolution of the problem.
Detailed Resolution Log	Diary	Unlim	Optional	Detailed steps in the resolution of the problem.
Submitter ID	Character	30	Required	User Id of the Submitter.
Submitter Name	Character	30	Optional	Full Name of the Submitter.
Submitter Phone	Character	30	Optional	Phone number of the Submitter.
Submitter eMail	Character	64	Optional	E-mail address of the Submitter.
Submitter Home DAAC	Character	60	Optional	Home DAAC of the Submitter.
History	Diary	Unlim	Optional	Upon submission or modification, the person assigned to the ticket and the ticket status will be indicated in the History field. Due to a limitation in Remedy, this information will only be written when the Assigned-to and Status fields are modified.
Assigned-To	Character	30	Optional	Person that trouble ticket has been assigned to.
Last-modified-by	Character	30	System generated	Person that last modified the trouble ticket.
Create-date	Date/Time	4	System generated	Date trouble ticket was created at the present site.
Last-Modified-date	Date/Time	4	System generated	Date the trouble ticket was last modified.
Related CCR	Character	60	Optional	ID of a related CCR.
Key Words	Character	255	Optional	Key words to help identify this trouble ticket.
Problem Type	Character	30	Optional	Type of problem addressed by this trouble ticket.
Closing Code	Character	60	Optional	Origin of the problem that this trouble ticket resulted from.
Closed-by	Character	60	Optional	Person who closed this trouble ticket.
Close-date	Date/Time	4	Optional	Date this trouble ticket was closed.

Table 1. Trouble Ticket Field Description (2 of 2)

Field Name	Data Type	Size	Entry	Description
Software Resource	Character	60	Optional	Software resource that the problem came from.
Hardware Resource	Character	60	Optional	Hardware resource that this problem came from.
Duplicate Master Id	Character	25	Optional	The Master Ticket-ID of this trouble ticket.
Forward-to	Character	60	Optional	Site that this trouble ticket was last forwarded to.
Forwarded-from	Character	60	Optional	Site that forwarded this trouble ticket.
Forwarded-by	Character	60	Optional	Contact person at the forwarding site.
Forward-date	Date/Time	4	Optional	Date trouble ticket was forwarded.
Unique-Identifier	Character	20	Optional	Unique identifier which is established at the origination site. This identifier should NEVER be changed once set.
Forwarded-to-1	Character	60	Optional	First site to have been forwarded this trouble ticket.
Forwarded-to-2	Character	60	Optional	Second site to have been forwarded this trouble ticket.
Forwarded-to-3	Character	60	Optional	Third site to have been forwarded this trouble ticket.
Forwarded-to-4	Character	60	Optional	Fourth site to have been forwarded this trouble ticket.
Associated Contact Log Id	Character	30	Optional	ID number of the associated contact log.

In addition to the fields described in the preceding table, the **RelB-Trouble Tickets** schema provides the following active links:

Forward -- Forwards the trouble ticket to the site specified in the **Forward-to** field (**Ticket Status** field must be set at **Forwarded**).

Hardware Information -- Opens a window that is associated with the trouble ticket to hold hardware information.

List All Masters -- All trouble tickets that are duplicates of each other have one master. This button lists all master trouble tickets.

List This TT's Duplicate(s) -- List all trouble tickets that are duplicates associated with this trouble ticket.

Go to Contact Log -- If the trouble ticket was created from a contact log (User Services), then this button opens a window to that contact log.

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Problem Resolution

Overview of Problem Resolution

- Every trouble ticket (TT) is logged into the Remedy database for record-keeping purposes.
- Each TT is evaluated first at the local center to determine the severity of the problem and to assign on-site responsibility for investigating the problem.
- TTs that can be resolved locally are assigned and tracked at the local center.
- Matters of sufficient importance are escalated to the agenda of the trouble ticket teleconference (known as the “TT Telecon”) for discussion and disposition.
 - sponsored by the Sustaining Engineering Organization (SEO).
 - held weekly.
 - functions as the ECS Failure/Malfunction Review Board (FRB).
 - participants discuss high-priority TTs and coordinate TT activities within the Maintenance and Operations (M&O) organization as well as with development, customer, and user organizations.

The TT Telecon and FRB review processes are the principal topics of a separate section of this lesson.

Trouble Ticket Triage

The Operations Supervisor at each center assigns priorities to trouble tickets using a triage system of maintenance priorities. The triage system is based on the degree to which a problem will adversely affect mission success. The following factors are considered:

- Scope of the problem’s effects (impact).
- Frequency of occurrence.
- Availability of an adequate work-around.

Problems can be classified into any of five categories, the first three of which are specified in the Performance Assurance Requirements document (*EOS Performance Assurance Requirements for ECS*, Goddard Space Flight Center (GSFC) 420-05-03). The following three categories are specified in the performance assurance requirements:

Category 1: System/Service cannot perform critical function or imposes major safety hazard. (Priority 1)

Presents an immediate impact to development, operations, services, or data processing functions; imposes major safety hazard to personnel, systems, or space mission resources; or results in loss of one or more essential mission objectives.

Category 2: System/Service substantially impaired. (Priority 2)

Substantially impacts development, operations, services, or data processing functions; fails to operate within critical performance specifications; or cannot effectively or efficiently fulfill baseline requirements.

Category 3: System/Service slightly impaired. (Priority 3)

Causes minor or no substantial impact to development, operations, services, or data processing functions. Support may be degraded, but mission can still be accomplished.

In addition, the SEO recognizes the following classifications:

Priority 4: Nuisance Problem.

The problem is minor, such as the arrangement of video screens, color, etc.

Priority 5: Closed Problem.

The issue is known and has a prior disposition.

Any problem report that meets the conditions of Category 1 is designated a "**Red Flag**" report. According to the performance assurance requirements, malfunctions most likely to be assigned Category-1 status are "those involving the command and control functions of the FOS or those that can result in inability to produce, or irretrievable loss of Essential Data Products."

The Trouble Ticketing System tool (Remedy) uses the priority codes **high**, **medium**, and **low**.

- Priorities are assigned by the Operations Supervisor using the triage system.
- Priorities are maintained by the Configuration Management (CM) Administrator.
- All Category-1 problems receive a **high** priority rating and are escalated to the attention of the Government Failure/Malfunction Review Board (FRB).
 - require both Government and Contractor Project Manager approval for final close-out.
- Category-2 problems are assigned a **medium** priority rating.
 - resolved by the local Trouble Ticket Review Board (TTRB).
 - resolution is sent to the attention of the FRB for "advice and acknowledgment."

- Remaining types of problems are assigned TT priorities at the discretion of the Operations Supervisor.
- Medium- and low-priority trouble tickets can often be handled locally unless they affect more than one site.
- Problems that affect multiple sites are forwarded to the System Monitoring and Coordination Center (SMC).

Trouble Ticket Review Board

The TT Review Board considers the problem and proposed solution for each TT that is referred to it.

- The TT Review Board may suggest, comment, reject, approve or otherwise recommend actions as the board deems appropriate (within the limits of its authority).
- If the resolution of a TT involves a configuration change (as determined by the board), the TT Review Board generates a Configuration Change Request (CCR).
 - problem is entered into the Change Request Manager (Distributed Defect Tracking System—DDTS) and is directed through the configuration management process, including review by the Configuration Control Board.
- If the resolution of a TT does not involve a configuration change and can be handled locally, the TT Review Board issues implementing instructions.
- After the problem has been corrected and the fix has been verified through testing, the TT Review Board orders the TT database administrator to close the trouble ticket.

Failure/Malfunction Review Board (FRB)

As previously mentioned, the FRB meets via “TT Telecon.” It has the following primary functions:

- review high-priority (Category-1) TTs.
- acknowledge the TTRB’s response to Category-2 problems.
- coordinate TT activities within M&O and with development, customer and user organizations.

This lesson includes a separate section on processing trouble tickets through the FRB.

Problem Resolution Process

The steps of the general problem resolution process are based on those depicted in the Maintenance & Operations Problem Management Concept. The steps provide an outline of an average **routine** TT’s life cycle.

Emergency fixes of problems that would prevent operation of the ECS (especially high-priority problems) may, under some circumstances, be made through a somewhat abbreviated process. However, proper follow-up procedures must be followed to ratify the emergency action. (This lesson includes a separate section on Emergency Fixes.)

Figures 5 and 6 illustrate the general problem resolution process. The steps of the process are described below. The system has been configured to allow each site the flexibility to create a life cycle from this example which best fits the site's needs. The procedural steps for making or changing entries in trouble-ticket fields are described in the Documenting Changes section of this lesson.

Problem Resolution

- 1 An ECS user or operator discovers a problem with ECS hardware, software, procedures, or documentation and decides to document this problem for investigation and resolution. He/she submits a TT as described in the Writing a Trouble Ticket section of this lesson.
- 2 Remedy logs the TT into the system, assigns **New** in the **Ticket Status** field and notifies the Operations Supervisor that there is a new TT.
- 3 The Operations Supervisor reviews the TT and assigns a priority (**High**, **Medium** or **Low**) in the TT **Assigned-Priority** field. The decision is based on the triage system of maintenance priorities.
- 4 The CM Administrator notifies all affected centers of the problem and requests their input to assist in assessing and resolving the problem.
 - There are two ways for a center to share TT information with another center.
 - forward the TT to the other center.
 - opens a new TT there.
 - send the center's TT database administrator an e-mail message containing relevant information.
 - problem can be reviewed without being logged in to Remedy.
- 5 The TT database administrator updates the TT database with inputs concerning the problem and how to resolve it.
- 6 The Operations Supervisor assigns (**Assigned-To** field) a Problem Investigator and a status of **Assigned** (**Ticket Status** field). The CM Administrator is charged with TT reporting responsibilities (especially reporting to the TTRB).
- 7 The Problem Investigator coordinates inputs from the Sustaining Engineering Organization (SEO), developers, vendors, and external organizations concerning how to resolve the problem at the local level. If there are significant issues to be resolved, the Problem Investigator presents them at the contractor TT Telecon sponsored by the SEO.
- 8 When the Problem Investigator identifies a solution to the problem, he/she updates the TT and changes the status to **Solution Proposed** (**Ticket Status** field).

- 9 The Problem Investigator forwards to the individuals/organizations on the notification list any information regarding proposed or implemented fixes.
- 10 The TT Review Board (and the Failure/Malfunction Review Board (FRB) for Priority-1 problems) considers the proposed solution for approval, ratification, rejection, revision, closure or forwarding as applicable.
- 11 The Failure/Malfunction Review Board and/or TT Review Board may approve the implementation of changes that do not affect configuration-controlled items.
- If they approve the solution, they direct the CM Administrator to change the TT status to **Implement Solution**.
 - When the person assigned to correct the problem has done so, he/she changes the TT status to **Solution Implemented**.
 - After the solution has been implemented and the results have been verified and approved by the TT Review Board, the CM Administrator closes the TT (changes TT status to **Closed**).
 - If the TT resolution involved temporary changes, the Maintenance Engineer updates the Baseline Manager.
 - If a permanent change is proposed, the TT Review Board generates a Configuration Change Request (CCR) to either the on-site or system-level Configuration Control Board (CCB) as appropriate.
 - Emergency fixes can be made and then reported to the CCB after the crisis has been resolved.
- 12 The CCBs may approve, reject, or revise the change proposal.
- TTRB is notified of results and reconsiders the TT accordingly
- 13 The on-site TT Review Board may revise the proposed solution.
- 14 The off-site problem resolution process is managed by the SEO TTRB, which may also revise the on-site proposed solution if there are any system-level effects. This is part of the escalation process, which also includes submitting CCRs if necessary.
- 15 A CCR may be escalated to higher-level CCBs for system and/or external elements (such as communications networks) that may be involved in resolving the problem.
-

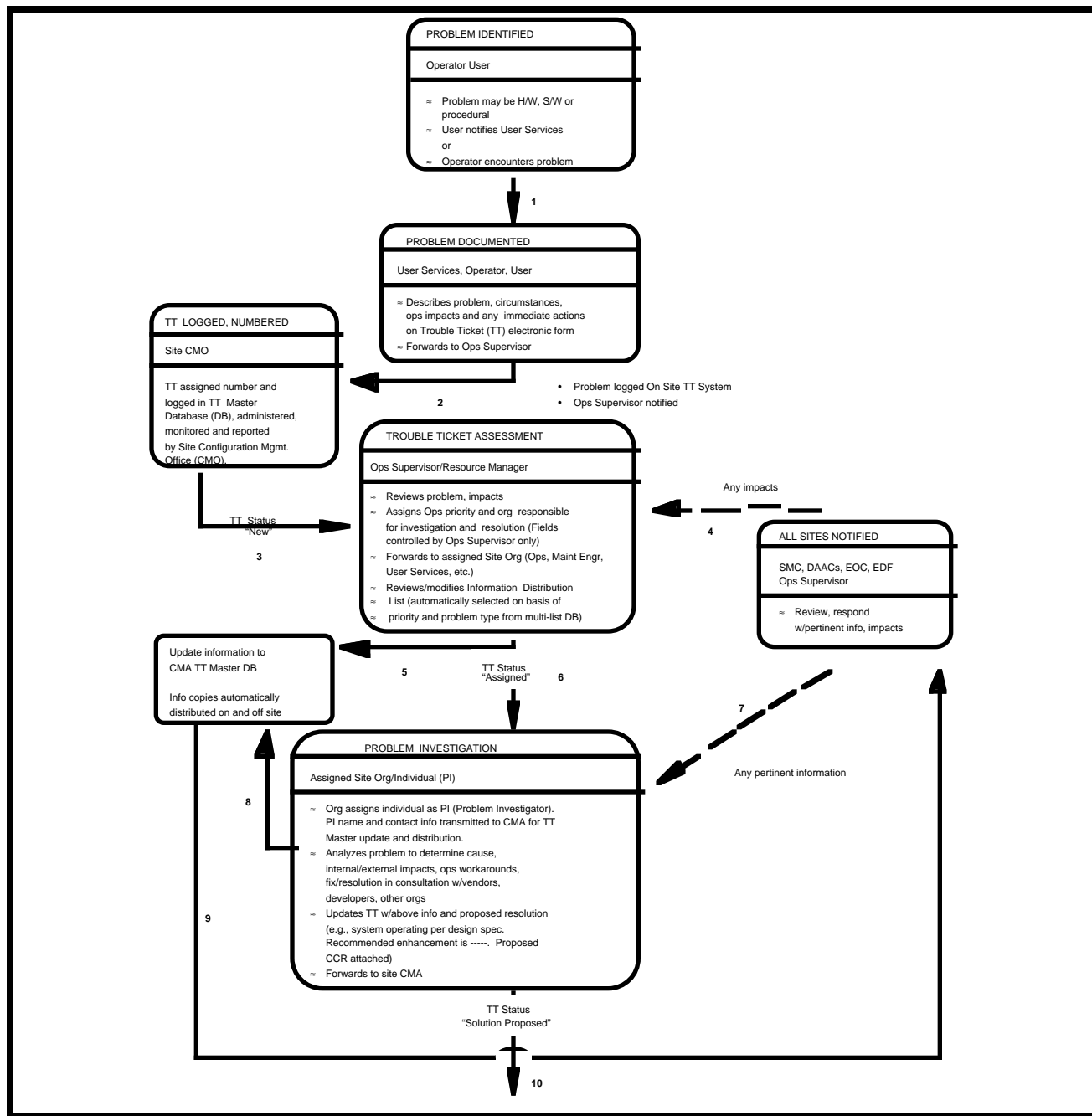


Figure 5. ECS Problem Management Concept, Part I

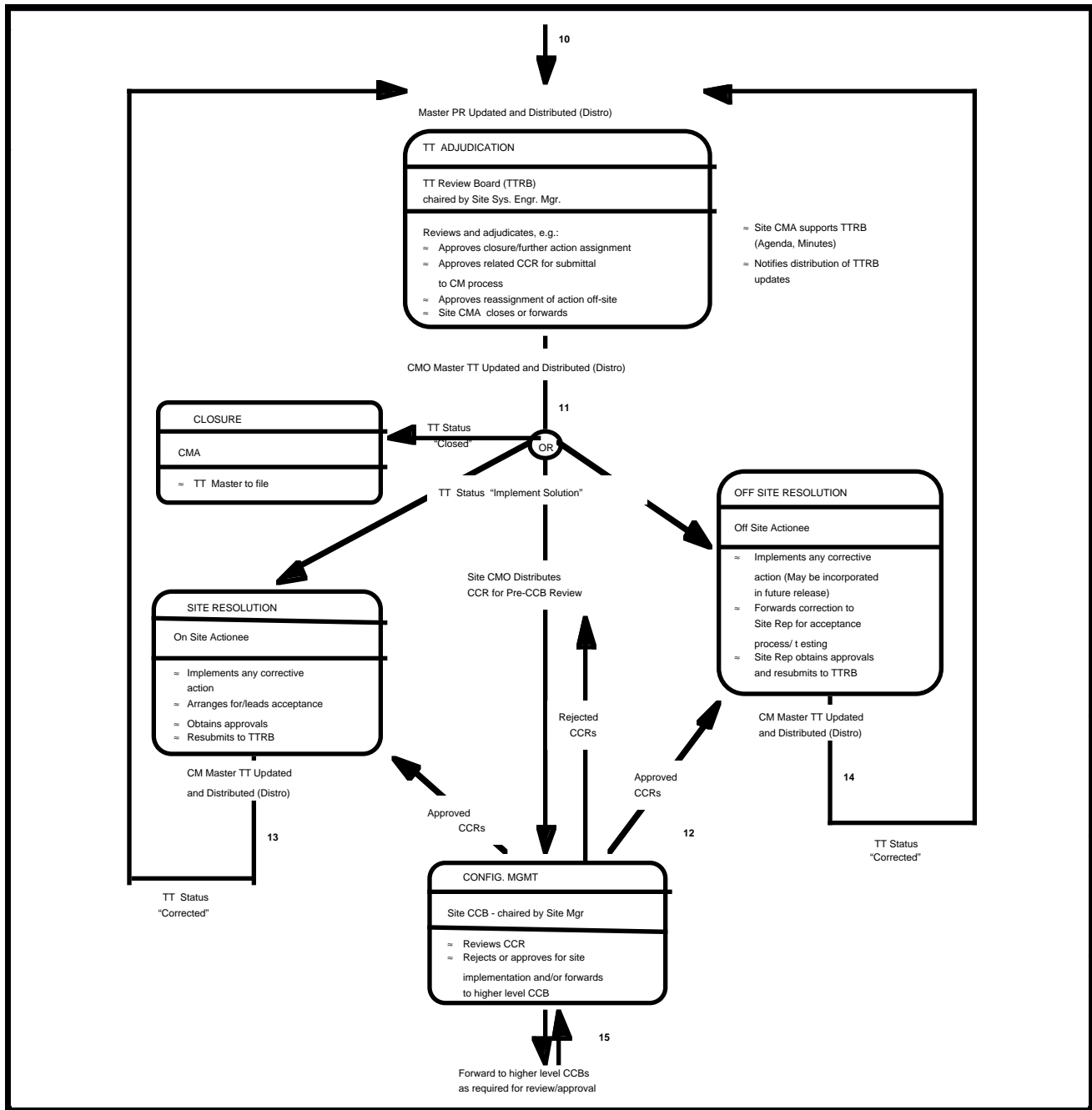


Figure 6. ECS Problem Management Concept, Part II

Problem Resolution Scenario

There is a scenario in the *Operations Scenarios for the ECS Project: Release A*, 605-CD-001-003, June 1996, that illustrates the process for resolving a **routine** problem. The scenario describes the “life cycle” of a trouble ticket from the time the ticket is submitted through the process of resolving the problem.

The scenario begins with an operator becoming aware that a network is running too slowly. The scenario continues with the operator's preparation and submittal of a trouble ticket, then through the process of opening the trouble ticket and analyzing and resolving the problem. The principal roles in the scenario are those of an operator, the Operations Supervisor, a technician and the ECS system.

The following steps have been extracted and adapted from the scenario:

1. Upon realizing that a problem exists, an operator selects the Trouble Ticket icon from the ECS Desktop. The ECS Desktop software calls up the Trouble Ticketing System (Remedy Action Request System).
2. The operator views the trouble ticketing window.
3. The operator selects the trouble ticket submit schema. The operator either selects his/her name from the **Submitter ID** field pick-list or types in his/her ID.
 - The system automatically retrieves operator information from the database (e.g., e-mail address, telephone number).
 - The information appears on the TT only after it has been submitted.
 - If the operator finds that the "submitter" information is not accurate, the operator should notify the TT database administrator to have it corrected.
4. The operator enters a short description of the problem and a long description in the appropriate fields of the form in the window.
 - The short description is mandatory.
 - The long description is optional but recommended.
 - The operator may select a **Submitter Impact** code (High, Medium or Low) if desired.
 - **Low** is entered by default if no operator selection is made.
5. Satisfied with the entry, the operator clicks on the **Apply** button to submit the TT.
 - If necessary, the operator sends the TT database administrator an e-mail message with an attached file of supplementary information concerning the problem identified in the trouble ticket.
6. The system creates a new entry in Remedy and notifies (via e-mail) the operator who submitted the TT and the Operations Supervisor.
 - Rules for notification via e-mail can vary from site to site.
7. The operator receives e-mail verifying that the TT was submitted. The Operations Supervisor receives notification that a new trouble ticket has entered the system.

8. The Operations Supervisor requests the system to refresh the TT list so he/she can check recent TTs.
 - The system (Remedy) refreshes the list.
9. The Operations Supervisor selects the TT from the list and requests the system to open it.
 - The system (Remedy) opens the TT.
10. Operations personnel may have Remedy generate reports and diagnostics of TTs to help in resolving the problem.
 - This step is optional.
 - The reports/diagnostics can be configured differently at each site.
11. On examining the detailed information, the Operations Supervisor changes the value of **Ticket Status** from **New** to **Assigned**.
 - In this scenario, the Operations Supervisor and the technician can assign any status or priority to a trouble ticket.
 - In practice each site will determine who is authorized to assign TT status and priority.
12. The Operations Supervisor assigns the value of **Low** (in this case) to the **Assigned-Priority** field.
13. The Operations Supervisor assigns the responsibility for fixing the problem described on the trouble ticket to a particular technician.
 - For ECS Release A TTs are not automatically assigned to the individual who will fix the problem.
14. The Operations Supervisor clicks on the **Apply** button to make the changes effective.
 - The system (Remedy) delivers e-mail notification of the assignment to the technician.
15. The technician receives e-mail notification of the assignment.
16. The technician makes initial entries in the **Detailed Resolution Log** and **Resolution Log** fields (which are free text diaries) indicating the proposed course of action.
 - The person who submitted the TT can review entries in the **Resolution Log** field.
 - The person who submitted the TT *cannot* review entries in the **Detailed Resolution Log**.

17. The technician then clicks on the **Apply** button to update the TT with the log data.
 - The system (Remedy) updates the TT.
18. As the technician analyzes and attempts to resolve the issue that the TT addresses, he/she updates the resolution logs (**Detailed Resolution Log** and **Resolution Log**) with pertinent information.
19. After each update to the resolution logs the technician clicks on the **Apply** button to order the system to make the update.
 - The system (Remedy) makes the update to the logs, including:
 - time/date.
 - name of modifier.
 - current log.
20. When the technician finds a solution to the problem, he/she changes the **Ticket Status** to **Solution Proposed**.
21. The TT Review Board Chair includes the TT in a package of new **Solution Proposed** TTs that he/she compiles for review by the board.
22. The TT Review Board considers the proposed solution for the TT.
 - TT Review Board deliberations include consideration of the following questions:
 - Is the proposed solution sensible?
 - What are the long-term effects of the proposed solution?
 - The TT Review Board may suggest, comment, reject, approve or otherwise recommend actions as they deem necessary (within the limits of their authority).
23. The TT Review Board approves the proposed solution and changes the **Ticket Status** to **Implement Solution**.
 - If the TT Review Board had found that the problem presented a configuration issue, they would have generated a CCR.
 - Generating a CCR introduces the problem into the configuration management process.
24. The technician makes the authorized fix to the problem and changes the **Ticket Status** to **Solution Implemented**.

25. The TT Review Board approves the fix and determines appropriate entries for the TT fields **Key Words**, **Closing Code**, and **Hardware Resource**.

- When the operator has verified the fix, the TT Review Board directs the TT database administrator to close the TT.
- The database administrator makes the TT Review Board-specified entries on the TT and changes the **Ticket Status** to **Closed**.

26. The operator receives e-mail notification from the Trouble Ticketing System that the TT has been closed.

For a description of a more serious problem that must be escalated to several levels of Configuration Control Boards, refer to the “Custom Software Problem Scenario,” Section 3.4.4 of the *Operations Scenarios for the ECS Project: Release A*, 605-CD-001-003, June 1996.

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Preparing a Trouble Ticket Telecon and Processing a Trouble Ticket through the Failure Review Board

The SEO and the site-level maintenance organization resolve routine maintenance issues at the system level and site level, respectively. The Failure/Malfunction Review Board (FRB) reviews and approves priority Category-1 issues and acknowledges the TTRB's disposition of Category-2 problems.

Trouble Ticket Telecon

The FRB discusses Category-1 and -2 TTs at a weekly TT Telecon. By means of the teleconference the FRB coordinates TT activities within the M&O organization and with development, customer, and user organizations. Telecon attendees are listed in Figure 7.

A typical TT Telecon agenda is shown in Figure 8.

- Agenda items may be supplemented or replaced with hardcopy or softcopy reports.
- Material from the meeting is distributed within each ECS organization and to customer and user organizations as required.

Failure Review Board Close-Out

The FRB obtains the assistance of appropriate groups and personnel to ensure that the causes of all malfunctions are determined through proper investigation and analysis.

- may obtain assistance from system hardware suppliers if necessary.
- coordinates investigations and remedial actions with the appropriate project personnel from the National Aeronautics and Space Administration (NASA).
- assures proper documentation of investigations and remedial actions.
- ensures that configuration changes (if any) are made in accordance with the configuration management procedures.

The following conditions must be verified before a malfunction may be "closed out":

- Remedial and preventive actions have been completed on the item in which the malfunction occurred.
- All necessary preventive design changes to the item have been completed and verified through testing.
- Effective preventive actions have been established to prevent problems with other affected items (if any).

- Customer representatives
- ECS SEO engineering team leads (one of whom is the TT Telecon/FRB chairperson)
- ECS ILS engineering support representatives
- ECS engineering team leads and operations representatives (via telecon)
- ECS M&O support staff
- ECS development organization representatives
- SCF(s) representatives (in person or via telecon)

Figure 7. TT Telecon/FRB Attendees

- Review and prioritize each TT opened at each center.
- Review and re-prioritize older TTs (as required).
- Assign TT work-off responsibility to one organization.
- Review distribution of TTs by organization, priority and age.
- Discuss TT issues with development organizations.

Figure 8. Typical Trouble Ticket Telecon Agenda

The FRB chairman (on behalf of the entire board) signs the close-out report before submitting it for NASA close-out. Malfunction reports are not considered “closed” until signed by the authorized Government representative.

All "Red Flag" reports...

- are highlighted at the Government assurance reviews (e.g., Capabilities and Requirements Reviews, Release Readiness Reviews, Segment Operational Readiness Reviews).
- must have their resolution approved by both the contractor project manager and the Government EOS Project Manager before the issue can be officially closed.

Making Emergency Fixes

The handling of emergency fixes varies with the nature of the problem and from ECS center to ECS center. There is a scenario in the *ECS Operations Concept for the ECS Project: Part 2A - ECS Release B*, 604-CD-003-002, November 1995, that illustrates the process for resolving an emergency situation involving an ECS hardware malfunction. Of course, each emergency must be dealt with individually; however, the following issues need to be decided in advance to provide a common framework for emergency responses to crisis-level situations:

- contingency plans.
- points of contact.
- general guidelines.

The hardware emergency change scenario should be considered a model process that can be used in the development of specific local procedures for making emergency fixes.

Hardware Emergency Change Scenario

The scenario involves the failure of hardware that requires the emergency replacement of a component that is of a later version than that contained in the baseline equipment. The problem occurs at 7:00 PM on a Saturday evening. The automated tape library (ATL) is inoperable and cannot be allowed to be out of service for the remainder of the weekend.

The following steps have been extracted and adapted from the scenario:

1. The operator has detected a problem with the automated tape library (ATL) and submits a TT. The Trouble Ticketing System records the TT and routes it to the system administrator.
2. The system administrator confirms that the system will not operate and notifies the site maintenance engineer.
3. The maintenance engineer runs further diagnostic tests to confirm the problem.
4. The maintenance engineer reports the problem and symptoms to the maintenance desk of the original equipment manufacturer (OEM). The maintenance engineer records the problem diagnosis and vendor call in the trouble ticket database.
5. The OEM maintenance representative arrives on site, verifies the symptoms, and concludes that a controller card has failed. However, the only card the OEM has immediately available is of a later version and no spares are available on site. It will be Monday at the earliest before a replacement board of the same revision level can be located.

6. The maintenance engineer reports the situation to the operations crew chief (i.e., shift leader) for a decision.
7. Because the DAAC cannot afford to have the ATL out of service until Monday, the crew chief calls the DAAC manager at home. The crew chief reports the situation to the DAAC manager and obtains approval to replace the defective board with the later version if tests conclude that the new one works properly.
8. The OEM's maintenance representative installs the replacement board.
9. The site's sustaining engineer tests the new controller board, finds that it works properly, and brings the ATL back on line.
10. The sustaining engineer generates a CCR to document the configuration change and the authority for the change.
11. The maintenance engineer records the board replacement on the TT, referencing the related CCR.
12. The maintenance engineer closes the trouble ticket.
13. The maintenance engineer updates the property record with the model, version, and serial number of the new board in the trouble ticket database.
14. The sustaining engineer records the installation in the CCR and routes the CCR to the CM administrator.
15. The CM administrator reviews the CCR and determines whether it needs to be reviewed by the site CCB.
16. The CM administrator updates the Baseline Manager with the new configuration and the number of the CCR that authorized the change.
17. The ECS SEO reviews the CCR to determine whether it has effects on the ECS system and/or other sites.
18. The Earth Science Data and Information System (ESDIS) CCB receives an information copy of the CCR for their review and concurrence.
19. The CM administrator closes the CCR when the CCB has ratified the change.

If it should later be discovered that the new version of the controller board has adverse effects when operating in the ECS configuration, it would be necessary to obtain a board of the original version to replace the newer version. The replacement of the newer-version board with an older-version board would be recorded on a new CCR that referenced the previous CCR.

Practical Exercise

Introduction

This exercise is intended to give the students practice in writing a trouble ticket, getting access to an existing trouble ticket and changing the information in trouble ticket data fields.

Equipment and Materials

One ECS workstation per student.

Mission Operation Procedures for the ECS Project, 611-CD-002-001, one copy per student.

Release A Operations Tools Manual, 609-CD-002-001, one copy per student.

Writing a Trouble Ticket

The exercise involves the writing of a trouble ticket. The exercise begins with an operator becoming aware that a network is running too slowly. The operator prepares and submits a trouble ticket.

Perform the following steps:

1. Prepare a trouble ticket stating that the network is running too slowly.
2. Submit the trouble ticket.

Documenting Trouble Ticket Changes

The exercise requires the student to locate a particular trouble ticket, make changes in trouble ticket fields, and have the changes applied to the trouble ticket.

Perform the following steps:

1. Display the specified trouble ticket on the workstation screen.
2. Make entries in the Detailed Resolution Log and Resolution Log indicating a solution to the problem.
3. Change the Ticket Status to "Solution Proposed".
4. Apply the changes to the trouble ticket.

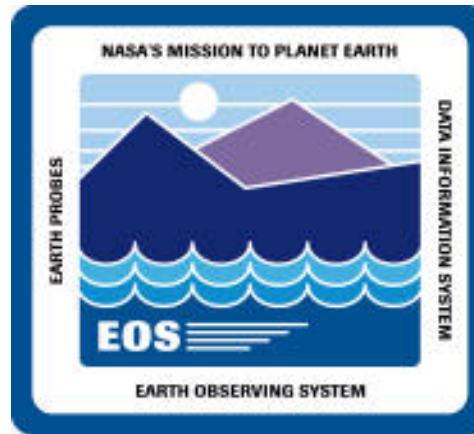
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Slide Presentation

Slide Presentation Description

The following slide presentation represents the slides used by the instructor during the conduct of this lesson.

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PROBLEM MANAGEMENT

ECS Version 2.0 Training

Overview of Lesson



- **Introduction**
- **Writing a Trouble Ticket (TT)**
- **Documenting Changes**
- **Problem Resolution**
- **Preparing a TT Telecon and Processing a TT through the Failure Review Board**
- **Making Emergency Fixes**
- **Practical Exercises**
 - **Writing a Trouble Ticket**
 - **Documenting TT Changes**

Objectives



- **OVERALL:**
 - Develop proficiency in trouble ticketing and problem resolution procedures
- **SPECIFIC:**
 - Submit a trouble ticket (TT)
 - Make changes to an existing TT
 - Describe the steps in the routine problem resolution process
 - Describe the steps in preparing a TT Telecon and processing a TT through the Failure Review Board
 - Describe the process of making emergency fixes

Objectives (Cont.)



- **STANDARD: Mission Operation Procedures for the ECS Project - 611-CD-002-001**

Writing a Trouble Ticket (TT)



- **Electronic document for:**
 - Reporting/recording problems
 - Recording an idea for a system enhancement
- **Problems affect the following ECS components:**
 - hardware
 - software
 - technical documents
 - procedures

Writing a Trouble Ticket (Cont.)



- **TTs are submitted by...**
 - users in the science community
 - ECS operators/staff
 - ECS developers
- **Trouble Ticket states:**
 - open
 - closed

Writing a Trouble Ticket (Cont.)



- If a configuration change is required, a Configuration Change Request (CCR) is prepared.
 - provides documentation for the configuration management process
 - a TT leads to a CCR only when a configuration change is proposed

Writing a Trouble Ticket (Cont.)



- **ECS Trouble Ticketing System provides a consistent means of...**
 - reporting ECS problems
 - classifying problems
 - tracking the occurrence and resolution of problems

Writing a Trouble Ticket (Cont.)



- **Trouble Ticketing System**
 - managed by Remedy's Action Request System
 - provides Graphical User Interface (GUI)
 - provides a common entry format
 - stores TTs
 - retrieves TTs
 - transfers TTs between facilities
 - produces reports
 - provides e-mail interface (automatic notification)
 - provides application programming interface

Writing a Trouble Ticket (Cont.)



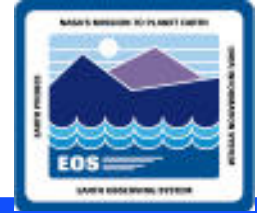
- **Trouble Ticketing System (Cont.)**
 - provides summary information to SMC
 - defines TT “life cycle”
 - allows customized escalation and action rules

Writing a Trouble Ticket (Cont.)



- **Trouble Ticketing System - methods of submitting TTs or checking TT status:**
 - **Remedy (Action Request System)**
 - **custom hypertext markup language (HTML) documents**
 - **text e-mail template**
 - **contacting a User Services representative at one of the DAACs**
 - » **by telephone**
 - » **in person**

Writing a Trouble Ticket (Cont.)



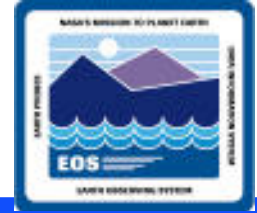
- **User Services - Contact Log**
 - separate Remedy schema (GUI) for recording user contacts
 - clicking a button transfers data from the contact log to the appropriate fields on a trouble ticket form

Writing a Trouble Ticket (Cont.)



- **Writing/Submitting Trouble Tickets**
 - **external users**
 - » HTML documents
 - » e-mail template
 - » contacting User Services
 - **internal operators and users**
 - » Remedy Action Request System

Writing a Trouble Ticket (Cont.)



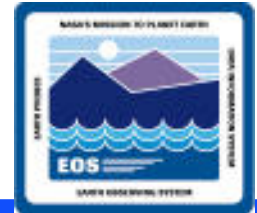
- **TTs are handled electronically**
 - common distributed-access database system
 - Remedy is the database tool
- **Supporting documentation must be handled separately**
 - not possible to attach a file in Remedy
 - via e-mail to the TT database administrator
 - sending/giving it to the TT database administrator
 - » **SMC Configuration Management (CM) Administrator**
 - » **SEO Operations Readiness and Performance Assurance Analyst**
 - » **DAAC Operations Readiness and Performance Assurance Analyst**

Writing a Trouble Ticket (Cont.): Procedure



- **Access Remedy User Tool**
 - Follow procedure to access Remedy
- **Log in if first-time user**
- **Select RelB-Trouble Tickets Schema**
 - File menu
 - Open Schema
- **Select Open Submit**
 - File menu

Writing a Trouble Ticket (Cont.): Release B Trouble Tickets Schema



Action Request System — RelB-Trouble Tickets (g0msh08)

File Edit Query Actions Macros Windows Help

Ticket-ID: [] Ticket Status: [Clear] Assigned-Priority: [Clear]

Short Description: [] Submitter Impact: [Clear]

Long-Description: [] Detailed Resolution Log: []

Resolution Log (End User Sees): []

Submitter ID: [] Assigned-To: [] Closing Code: []

Submitter Name: [] Last-modified-by: [] Closed-by: []

Submitter Phone: [] Create-date: [] Close-date: []

Submitter eMail: [] Last-Modified-date: [] Software Resource: []

Submitter Home DAAC: [] Related CCR: [] Hardware Resource: []

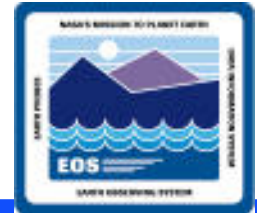
History: [] Key Words: [] Hardware Information: []

CI: [] Problem Type: []

List All Masters

Query: []

Writing a Trouble Ticket (Cont.): “Open Schema” Window

The "Open Schema" dialog box is shown. It has a title bar with the text "Open Schema". Inside, there is a section titled "Available Schemas" containing a list of four items: "RelB-Contact Log (g0msh08)", "RelB-TT-ForwardToSite (g0msh08)", "RelB-Trouble Tickets (g0msh08)", and "Trouble-Ticket-Xfer (g0msh08)". Below this list is a note: "* indicates a server that is not reachable". Underneath the note is a section titled "Selection" with a text input field containing the letter "I". At the bottom of the dialog are two buttons: "Apply" and "Dismiss".

Writing a Trouble Ticket (Cont.): Trouble Ticket “Submit” Window



Submit — RelB-Trouble Tickets (g0msh08)

Ticket-ID: Ticket Status: Assigned - Priority:

Short Description: Submitter Impact:

Long-Description: Detailed Resolution Log:

Resolution Log (End User Sees):

Submitter ID: Assigned-To: Closing Code:

Submitter Name: Last-Modified-by: Closed-by:

Submitter Phone: Create-date: Close-date:

Submitter eMail: Last-Modified-date: Software Resource:

Submitter Home DAAC: Related CCR: Hardware Resource:

History: Key Words: Hardware Information:

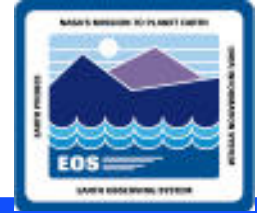
CI: Problem Type:

Writing a Trouble Ticket (Cont.): Procedure



- **Type a short description of the problem**
 - Short Description field
- **Fill in Submitter ID**
 - Submitter ID field
 - Use pick-list
- **Select Submitter Impact**
 - High, Medium or Low
 - Optional
 - Low is default

Writing a Trouble Ticket (Cont.)



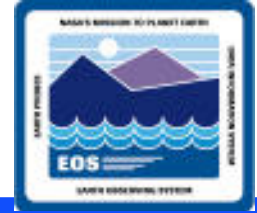
- **Fill in optional data:**
 - Long Description
 - Software Resource
 - Hardware Resource
- **Verify data**
- **Submit the TT**
 - click on the Apply button
 - confirmation message appears at bottom of window
 - Remedy also sends confirmation by e-mail

Writing a Trouble Ticket (Cont.)



- **Exit from the Remedy Action Request System**
 - Dismiss button
 - File menu
- **Send backup information/documentation to the TT database administrator**
 - send e-mail cover message
 - » identify TT number
 - » provide Submitter ID
 - » include relevant information concerning attachments

Documenting Changes



- **Trouble tickets are modified at various stages of problem resolution, for example:**
 - assignment to a technician for problem resolution
 - resolution log entries.
 - changes of status.
 - forwarding to another site.
- **Access privileges**
 - controlled by the database administrator
 - determine which TT fields an operator/user may modify

Documenting Changes (Cont.): Reviewing and Modifying Open TTs



- **Access Remedy User Tool**
 - Follow procedure to access Remedy
- **Select RelB-Trouble Tickets Schema**
 - File menu
 - Open Schema
- **List TTs**
 - Query menu

Documenting Changes (Cont.): Trouble Ticket “Query List” Window



Query List -- RelB-Trouble Tickets (g0msh08)

Query Actions

Matching entries:

GSF000000000003 ECS Problem for Training

Number of matching entries : 1 (11/13/97 15:25:26)

Poll ☒ Off ☐ On 10 Minutes

Refresh Dismiss

Documenting Changes (Cont.): Reviewing and Modifying Open TTs



- **Highlight/select the TT to be reviewed/modified**
- **Select Modify Individual**
 - Query menu
- **Review/Modify TT fields**
- **If forwarding the TT:**
 - set Ticket Status at Forwarded
 - select (from pick-list) the center to receive the TT
 - click on the Forward button

Documenting Changes (Cont.): Reviewing and Modifying Open TTs



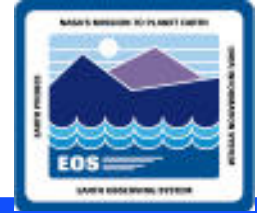
- **Apply changes**
 - click on the Apply button
- **Exit from the Remedy Action Request System**
 - Dismiss button
 - File menu

Problem Resolution



- **Overview of Problem Resolution**
 - Every trouble ticket (TT) is logged into the Remedy database for record-keeping purposes
 - Each TT is evaluated first at the local center
 - » determine the severity of the problem
 - » assign on-site responsibility for investigating the problem
 - TTs that can be resolved locally are assigned and tracked at the local center

Problem Resolution (Cont.)



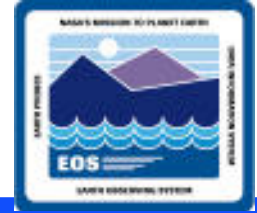
- **Overview of Problem Resolution (Cont.)**
 - **Matters of sufficient importance are escalated to the agenda of the trouble ticket teleconference (“TT Telecon”)**
 - » **sponsored by the Sustaining Engineering Organization (SEO)**
 - » **held weekly**
 - » **functions as the ECS Failure/Malfunction Review Board (FRB)**
 - » **participants discuss high-priority TTs and coordinate TT activities within the Maintenance and Operations (M&O) organization as well as with development, customer, and user organizations**

Problem Resolution (Cont.)



- **Operations Supervisor reviews TTs and assigns priorities by triage**
- **Triage system of maintenance priorities**
 - **system for assessing adverse effects on mission success on the basis of the following factors:**
 - » **scope of the problem's effects (impact)**
 - » **frequency of occurrence**
 - » **availability of an adequate work-around**

Problem Resolution (Cont.)



- **Classification of Problems**
 - **Performance Assurance Categories**
 - » 1: system/service cannot perform critical function or imposes major safety hazard (“Red Flag”)
 - » 2: system/service substantially impaired
 - » 3: system/service slightly impaired
 - **SEO Priorities**
 - » 4: nuisance problem
 - » 5: closed problem

Problem Resolution (Cont.)



- **Red Flag reports (Category-1)**
 - malfunctions “involving the command and control functions of the FOS or those that can result in inability to produce, or irretrievable loss of Essential Data Products.” (Performance Assurance Requirements)

Problem Resolution (Cont.)



- **Remedy priority codes**
 - high
 - medium
 - low
- **Priorities are assigned by the Operations Supervisor**
 - using the triage system
- **Priorities are maintained by the Configuration Management (CM) Administrator**

Problem Resolution (Cont.)



- **Category-1 problems receive a high priority rating**
 - are escalated to the attention of the FRB
 - require both Government and Contractor Project Manager approval for final close-out
- **Category-2 problems are assigned a medium priority rating**
 - resolved by the local Trouble Ticket Review Board (TTRB)
 - resolution is sent to the attention of the FRB for “advice and acknowledgment”

Problem Resolution (Cont.)



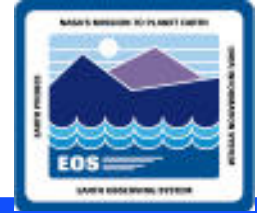
- **Remaining types of problems are assigned TT priorities at the discretion of the Operations Supervisor**
- **Medium- and low-priority trouble tickets can often be handled locally**
 - unless they affect more than one site
- **Problems that affect multiple sites are forwarded to the System Monitoring and Coordination Center (SMC)**

Problem Resolution (Cont.)



- **TT Review Board (local)**
 - may suggest, comment, reject, approve or recommend other actions
 - generates a CCR if the problem involves a configuration change
 - » problem is entered into the Change Request Manager and directed through the configuration management process
 - issues implementing instructions if a local problem involves no configuration change
 - orders the closure of problems that have been corrected and whose fixes have been verified

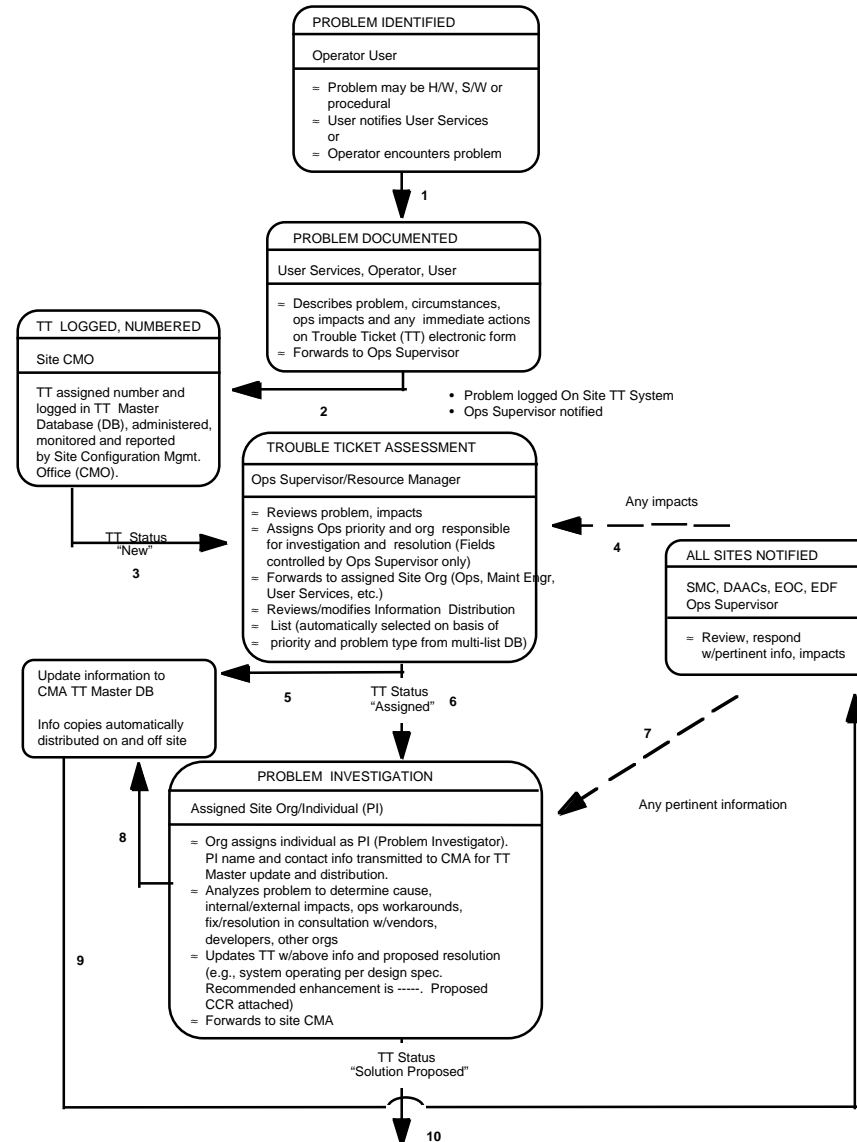
Problem Resolution (Cont.)



- **Failure/Malfunction Review Board (FRB)**
 - meets via “TT Telecon”
 - reviews high-priority TTs (Category 1)
 - acknowledges TTRB response to Category- 2 problems
 - coordinates TT activities within M&O and with development, customer and user organizations

Problem Resolution (Cont.)

Problem Management Concept Pt. I





Problem Resolution (Cont.): Process



- **User/operator discovers problem; submits TT**
- **Remedy logs TT into system, assigns status (“New”) and notifies Operations Supervisor**
- **Operations Supervisor reviews TT and assigns priority**
- **CM Administrator notifies affected centers (if any)**
 - may forward TT to other center(s)
 - may send e-mail message with information

Problem Resolution (Cont.): Process



- **TT database administrator updates database with inputs**
- **Operations Supervisor assigns problem to Problem Investigator (PI) and changes ticket status to “Assigned”**
- **PI coordinates inputs from various sources; presents significant issues (if any) at TT Telecon**
- **PI updates TT database after finding a solution to the problem; changes TT status to “Solution Proposed”**

Problem Resolution (Cont.): Process



- **PI forwards information on proposed solution/fix**
- **TT Review Board considers problem; approves, rejects or revises proposed solution; refers configuration issues to the CCB(s)**
 - **if TTRB approves solution, CM Administrator changes TT status to “Implement Solution”**
 - **person who corrects problem changes TT status to “Solution Implemented”**
 - **after fix has been verified and TTRB approves, CM Administrator changes TT status to “Closed”**

Problem Resolution (Cont.): Process



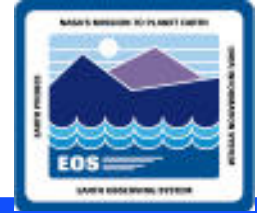
- **CCBs may approve, reject or revise change proposals (CCRs)**
 - TTRB is notified of results and reconsiders the TT accordingly
- **On-site TTRB may revise a proposed solution**
- **Off-site problem resolution process is managed by the SEO TTRB**
 - may revise a proposed solution if there are system-level effects
- **CCRs may be escalated to higher-level CCBs**
 - if system-level or communications components are involved

Problem Resolution (Cont.)



- **Trouble ticket and problem tracking scenario**
 - slow network
 - routine problem
- **Custom software problem scenario**
 - configuration management issues

TT Telecon and FRB (Cont.)



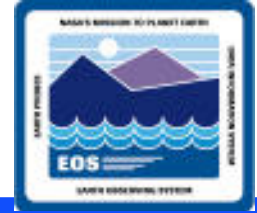
- **All Category-1 and -2 problems are submitted to the FRB TT Telecon**
 - Category 1 for review and approval
 - Category 2 for acknowledgment and advice
- **FRB uses the TT Telecon to coordinate TT activities within M&O and with development, customer and user organizations**

TT Telecon and FRB (Cont.): TT Telecon/FRB Attendees



- **Customer representatives**
- **ECS SEO engineering team leads (one of whom is the TT Telecon/FRB chairperson)**
- **ECS ILS engineering support representatives**
- **ECS engineering team leads and operations representatives (via telecon)**
- **ECS M&O support staff**
- **ECS development organization representatives**
- **SCF(s) representatives (in person or via telecon)**

TT Telecon and FRB (Cont.): TT Discussion



- Review and prioritize each TT opened at each center.
- Review and re-prioritize older TTs (as required).
- Assign TT work-off responsibility to one organization.
- Review distribution of TTs by organization, priority and age.
- Discuss TT issues with development organizations.

TT Telecon and FRB (Cont.)



- Agenda items may be supplemented or replaced with hardcopy or softcopy reports
- Material from the meeting is distributed within each ECS organization and to customer and user organizations as required

TT Telecon and FRB (Cont.)



- **FRB obtains all necessary assistance to ensure thorough analysis of the problem**
 - may obtain assistance from system hardware suppliers
 - coordinates investigations and remedial actions with the appropriate project personnel from the National Aeronautics and Space Administration (NASA)
 - assures proper documentation of investigations and remedial actions
 - ensures that configuration changes (if any) are made in accordance with the configuration management procedures

TT Telecon and FRB (Cont.)



- **Conditions to be verified before a malfunction report may be closed out:**
 - remedial and preventive actions completed on item
 - preventive design changes completed and verified
 - effective preventive actions established to prevent problems with other affected items

TT Telecon and FRB (Cont.)



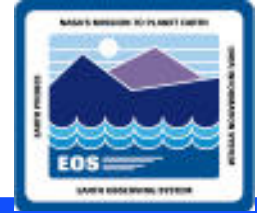
- **Both FRB (first) and NASA must officially approve each Category-1 problem resolution submitted to the FRB to close it out**
- **Red Flag reports**
 - are highlighted at Government assurance reviews
 - must have their resolution approved by both:
 - » contractor project manager
 - » government EOS Project Manager

Making Emergency Fixes



- **Procedure varies**
 - nature of the problem
 - from ECS center to ECS center
- **Issues for providing a common framework for emergency responses to crisis-level situations:**
 - contingency plans
 - points of contact
 - general guidelines

Making Emergency Fixes (Cont.)



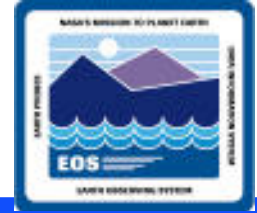
- **General process not specific procedure**
 - **model process: Hardware Emergency Change Scenario (604-CD-003-002)**

Making Emergency Fixes (Cont.): Hardware Emergency Change



- **Operator detects problem with ATL on Saturday evening; submits a TT**
- **System administrator confirms problem; notifies site maintenance engineer**
- **Maintenance engineer confirms problem**
- **Maintenance engineer reports problem to OEM**
- **OEM maintenance representative arrives, verifies symptoms, diagnoses faulty controller card; only spare available is of a later version**

Making Emergency Fixes (Cont.): Hardware Emergency Change



- Maintenance engineer reports situation to operations crew chief
- Operations crew chief calls DAAC manager at home to report situation; DAAC manager approves board replacement with newer version contingent on acceptable testing results
- OEM maintenance representative installs replacement board
- Sustaining engineer tests new board; brings ATL back on line

Making Emergency Fixes (Cont.): Hardware Emergency Change



- Sustaining engineer generates CCR to document the configuration change
- Maintenance engineer records board replacement on TT, referencing CCR
- Maintenance engineer closes TT
- Maintenance engineer updates TT system property record with data on new board
- Sustaining engineer records installation in CCR; routes CCR to CM administrator

Making Emergency Fixes (Cont.): Hardware Emergency Change



- **CM administrator decides whether to refer CCR to CCB**
- **CM administrator updates Baseline Manager**
- **ECS SEO reviews CCR to determine effects on ECS system and other sites**
- **ESDIS CCB receives copy of CCR for review and concurrence**
- **CM administrator closes CCR when CCB has ratified the change**